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Careful observations, extending over many years, in widely-separated countries and among various nations, have demonstrated that the mortality of the human family is governed by a law which is constant in its operation. That inevitable power, death, working through its numberless agencies, by disease, accident, and violence, and seeming to seek its victims by chance, is ruled by an intelligence which preserves the balance of population, directs the laws of supply and demand, and renders possible the various calculations upon which the commerce of the world is based.

The most extensive compilations of statistics, and the most precise calculations which have been made in search of the law of mortality, are those derived from investigations among what are known as selected lives, or those which are unimpaired by hereditary taint, and are found by the examination of physicians to be practically free from disease. A mortality table was constructed in 1843 from careful observations among a large number of such lives whose course could be accurately traced, and numerous more recent investigations have served to confirm the substantial correctness of the death-rate which was then shown to exist.

Let us suppose that the man whose surplus earnings are \$1,500 a year is thirty years of age and in good health, and that money is worth 4 per cent. per annum. By the mortality table, to which allusion has been made, the present value of the future surplus earnings of this life is \$25,560.

It is true that this value is based on averages, and that the assumption that he will, through his life, receive and spend just the amounts here set down will not probably be realized. It is well-nigh certain that his death will occur either before or after the date here fixed. Disease or accident may rob him permanently of his productive power. Circumstances which no skill guided by research can calculate, and no judgment foretell, may change the current of his life, and enhance or diminish the value of his efforts. And yet this value rests upon a foundation composed of elements no more uncertain than those which determine the worth of the business block. Both the building and the life are constantly exposed to the danger of destruction, but that chance can be measured even more accurately in the latter case than in the former.

The natural ability of one man is greater than that of another, and this advantage will be shown in the value of their respective services. These qualities, as well as those of industry and perseverance, are inborn traits, and will, considered in connection with education and training, determine the amount for which the possessor can lease his efforts to others or employ them for independent profit. What nature has done for the man corresponds with the location of the building. What experience has taught him is like the quality of the structure. In each case there are certain necessary expenditures which must be met before any real value can exist, and in each case the worth rests upon estimates.

JOHN M. HOLCOMBE.

III.

NAVAL EDUCATION IN THE FUTURE.

THE advent of new cruisers and battle-ships to the navy of the United States has given rise to an imperative demand for change in the old system of drill and training so long in vogue in the service. That such a change has become necessary is now evident to the officials of the Navy Department, and is apparent in the recent order of the Secretary of the Navy convening a board of prominent officers, instructed to examine carefully and report for adoption a method of training and drill compatible with the times. The work which this board has in hand is an all-important one. In effecting the end desired, obstacles in every imaginable form will be encountered, not the least of which will be the opposition arising from the older officers, who are opposed to all innovation. It is not an easy matter to impress upon the adherents of the old school the fact that the days of "yard-arm" fighting, when hand-grenades, cutlasses, and pikes were powerful adjuncts in deciding engagements, when for hours ships manœuvred for position before "closing in," are irretrievably of the

past, and that methods of fighting in keeping with the scientific developments of the day will characterize future combats on the sea.

One is fairly well able to calculate beforehand the result of a naval engagement of to-day, provided there are at hand official data of the battery and armor strength, speed, and manœuvring powers of the opposing vessels. In such calculations the personal equation is not considered when great discrepancy exists in the comparative efficiency of the opposing vessels; but let there be a near approach to similitude, and the engagement can, with safety, be adjudged as resultant in favor of the better disciplined and trained crews, to the forces combining bravery and daring with the employment of modern fighting tactics. History furnishes many instances of numerically-inferior forces gaining victories by reason of their high state of discipline and training; and though naval forces of to-day depend greatly on vessel types to give them victory, there is, nevertheless, a demand for discipline and training of an even higher state than has been known in the past.

But it must not be forgotten that there is a vast difference between discipline and training. A crew may be thoroughly disciplined, and yet be ignorant of the most important duties a thorough knowledge of which can alone insure success. On the other hand, a trained crew, efficient in every sense of the word, may be sadly lacking in discipline. It not uncommonly happens that the crews noted for their smartness, and especially so when brought into competition with others, are the most unruly. The same is true of the land service. The battalion that passes the reviewing-stand without a break, that executes manœuvre after manœuvre with perfection in every detail, is not always the command that shows the least number of names on its misdemeanor report. The Germans are fully cognizant of this fact, and Prince Kraft has taken occasion in his artillery report to remark that he has often found the poorest-showing batteries and battalions on review to be better disciplined and more orderly commands than others far superior to them in training.

Within the past decade tremendous strides have been made by the navies of Great Britain and France towards obtaining a higher state of efficiency. In the case of the French service, the progress has, perhaps, been the most marked. France has attempted to do more than make sailors of her men. She has endeavored to make them soldiers as well, and, as evidence of what her naval forces are capable of accomplishing ashore, she proudly points to the showing made by the men from the Brest fleet when stationed in the trenches before Paris. To these sailor battalions was universally accorded the honor of having in their ranks the best fighting men about Paris. What France has accomplished with her naval forces appears to be the aim of efforts recently instituted by the naval powers. The fact of an admiral having in his squadron a force of 2,000 or 3,000 men capable of being rapidly thrown on shore and operated as a body of so many trained soldiers, is recognized as a most salient feature, and one tending to increase materially the strength of any power depending on its naval establishment for the maintenance of its foreign interests. Notwithstanding the high state of efficiency in which the British service is supposed to be, there is just now a most decided clamoring for courses of instruction more modern, more adaptable to the times.

In the United States naval service there has been absolutely nothing done—not even since the establishment of a new navy was decided upon—towards increasing the efficiency of the personnel. The drills, the training, and the routine now in force aboard our war-ships are much what they were twenty, and even thirty, years ago. The dogmatical tenacity with which members of the old school have insisted on meting out instruction and duty incident to the days of their boyhood has created that form of indifference always the result of enforcing upon the intelligent and thinking mind work long known to be not only useless and out of place, but a waste of time. The young apprentices are now being trained without regard to the new navy. The instruction which they are receiving aptly fits them for service on board a type of vessel peculiar to the "fifties." It is not to be disputed that a certain amount of sail and spar drill is good instruction for a young seaman. Let him be one of a prize crew detailed to take a merchant ship into port, and his knowledge

will be of service to him; but as to years being spent in exercises long relegated to the past, when even the most assiduous application will enable one to keep pace with modern developments, such a policy as has been pursued in the past is little short of suicidal. The British Admiralty is at least determined that the younger officers shall not waste their opportunities, and has directed, in a recent order, that in future "midshipmen shall be ordered only to 'mastless ships.'" This is to enable the time that might have been taken up by spar and sail drill to be devoted to studies important to the duties of modern naval officers.

There appears to have developed of late considerable duty for naval forces ashore. This is seen in the recent operations of British naval battalions in Egypt, of French naval forces in Tonquin, of the Germans on the east coast of Africa and in the Pacific, of the Portuguese forces on the west coast of Africa, of the Italians in the north, and of our own forces on the Isthmus of Panama and out in the Pacific. The duty of a man-of-war's man of to-day is essentially that of a soldier; the clouds of canvas which were once his delight have disappeared, even the masts themselves, and there is now left but the grim row of guns, the armory floor-like deck, and the piles of rifles, cutlasses, and revolvers. But there lacks yet the proper infusing of the military spirit. The aversion in bygone years to all pertaining to a soldier's still apparent among the older officers, as a part of the teachings of the old school. As a result, young officers are seen even now hurriedly going through a company drill, caring little, except that it enables an account to be put in the reports that such drill has been performed. One seldom sees attention paid to detail, except so far as to insure a fairly good showing when the ship is called upon to send an infantry company to "parade."

As to small-arm firing and target practice, the men know little or nothing. The navy regulations specify that so many rounds (twenty) shall be fired in a year, but the number allowed is far too small to produce any good from the practice. But little encouragement is offered to men for extra exertions, and there are no prizes, as in the British and French service, for special skill. The crews of the American war-ships are, as a rule, disciplined crews, but as crews trained in all pertaining to modern warfare, they are sadly deficient.

It will become imperative, now that ships without masts are to come into service, that an expedient be devised for the exercise lost in "activity aloft." The long, broad decks of the new ships, especially those of the "Chicago," "Baltimore," "Newark," "Maine," and "Texas" type, offer every facility for the erection of gymnastic apparatus. Officers and men can alike do regular duty in this line, which will serve greatly to shake off the apathy that seizes hold of a crew little drilled. There cannot be too much attention paid to the development of the individual sailor, both to obtain a trained factor and a physically perfect one. There has been, no doubt, much odium cast on the crews of the American war-ships because of the great numbers of foreigners allowed to enlist, all of which has served to lessen the interest that officers should take in the men. It is well known that this foreign element must be got rid of before the navy will become a popular service, and there is no surer way of accomplishing both ends than by making the naval establishment a thoroughly military one. The sooner the service awakes to a realizing sense that the navy of to-day is a modern institution, a fighting factor devoid of all the romance of the past, the sooner the country will be prepared to resist all inroads from hostile sources.

G. L. CARDEN.

IV.

WILL OUR COAL SUPPLY EVER BE EXHAUSTED?

TIME was when the carbon and hydrogen which form practically the whole of our supply of fuel and the principal part of our food were inorganic—no more capable of sustaining combustion or animal life (if we except certain microscopic forms which decompose carbonic acid) than granite or slate. For vegetable life, however, the supply of food was at its maximum. Vegetable life came, generated in some unknown way by the solar energy which poured through the atmosphere and the heat energy which penetrated the earth's crust from within. Through the unimaginable ages